

## WHAT IS CLAIMED IS:

1. In a device for restoring an orthogonal frequency division multiplexing (OFDM) signal by estimating a transmission channel property of the OFDM signal from correlation between the  $m$ -th and  $m+1$ th symbols of the OFDM signal, a device for receiving the OFDM signal, comprising:

an ADC for converting an analog OFDM signal into a digital signal;  
a control device for sampling the digital signal from the ADC according to a sampling clock generated with a predetermined timing, and detecting a symbol from the sampling value;

an FFT unit for performing a fast Fourier transform on the symbol from the control device;

an operation device for calculating a common phase noise and an offset amount due to sampling clock timing in regard to the symbol from the FFT unit, compensating for the symbol according to the resultant value, and providing the offset amount due to the sampling clock timing to the control device;

a channel estimation unit for estimating a channel property value according to the symbol compensated by the operation device; and

an equalizing device for compensating for channel distortion of the symbol from the FFT unit according to the channel property value from the channel estimation unit.

2. The device according to claim 1, wherein the control device comprises:  
a control unit for determining the sampling timing according to the offset amount ;

an interpolation unit for sampling and outputting the digital signal from the ADC according to the sampling timing from the control unit; and

a detection unit for detecting a start position of the OFDM symbol according to the signal from the interpolation unit, and outputting the start position in symbol units.

3. The device according to claim 1, wherein the operation device comprises:  
a storing unit for storing the signal from the FFT unit;

an estimation unit for estimating the offset amount due to the sampling clock timing  
and the common phase noise of the  $m$ -th and  $m+1$ th symbols in the storing unit; and

5 a compensation unit for compensating for the offset amount and the common phase  
noise of the symbols according to the estimated offset amount and common phase noise from  
the estimation unit, and outputting the compensated symbols to the channel estimation unit.

4. The device according to claim 3, wherein the compensation unit outputs the  
offset amount to the control device.

5. The device according to claim 3, wherein the storing unit comprises:

a first storing unit for outputting the  $m$ -th signal to the estimation unit to estimate phase  
distortion of the  $m$ -th signal, and outputting the  $m$ -th signal to the channel estimation unit to  
estimate the channel property of the  $m$ -th signal; and

a second storing unit for outputting the  $m+1$ th signal to the estimation unit to estimate  
phase distortion of the  $m$ -th signal, and outputting the  $m+1$ th signal to the compensation unit  
to compensate for phase distortion of the  $m+1$ th signal.

6. The device according to claim 5, wherein the estimation unit receives the  $m$ -th  
and  $m+1$ th symbols from the first and second storing units, and estimates the sampling clock  
offset amount and the common phase noise according to the phase values of the two symbols.

7. The device according to claim 6, wherein the compensation unit compensates  
for the sampling clock offset and the common phase noise of the  $m+1$ th symbol from the  
second storing unit according to the estimated values from the estimation unit, outputs the  
resultant symbol to the channel estimation unit, and outputs the sampling clock offset amount  
5 to the control device.

8. In a method for restoring an orthogonal frequency division multiplexing(OFDM) signal by estimating a channel of the OFDM signal from correlation between the m-th and m+1th symbols of the OFDM signal, a method for restoring the OFDM signal by channel estimation, comprising:

- a first step of sequentially converting OFDM symbols into digital signals;
- a second step of detecting the digital signals in symbol units, performing a fast Fourier transform thereon, and sequentially outputting the transformed symbols;
- a third step of compensating for the m+1th symbol, by estimating a sampling clock offset amount and a common phase noise from the m-th and m+1th symbols; and
- a fourth step for compensating for distortion of the m-th signal, by estimating the channel property of the m-th symbol according to the compensated m+1th symbol.

9. The method according to claim 8, wherein the second step comprises the steps of:

- determining a sampling timing of the digital signal;
- outputting a start position of the OFDM symbol the determined sampling timing; and
- performing said fast Fourier transform on the symbol.

10. The method according to claim 8, wherein the third step comprises the steps of:

- storing the m-th symbol in a first storing unit and the m+1th symbol in a second storing unit;
- estimating sampling clock offset amount and common phase noise from the m-th and m+1th symbols; and

- compensating for the sampling clock offset amount and the common phase noise of the m+1th symbol according to the estimated sampling clock offset amount and common phase noise.

11. The method according to claim 10, further comprising a step for adjusting the sampling timing of the digital signal according to the estimated sampling clock offset amount.

12. The method according to claim 11, wherein, in the fourth step, the channel property of the m-th symbol is estimated by calculating an average of the phase of the subcarrier of the m-th symbol and the phase of the subcarrier of the m+1th symbol.

13. The method according to claim 12, wherein, in the third step, the common phase noise and the sampling clock offset amount of the m-th symbol are estimated using a phase difference due to the common phase noise between the m-th and m+1th symbols, and a phase variation difference due to the sampling clock offset.

14. The method according to claim 13, wherein the respective subcarriers of the m+1th symbol are compensated according to the estimated common phase noise and sampling clock offset value of the m-th symbol.

15. A method for restoring an orthogonal frequency division multiplexing(OFDM) signal by channel estimation, comprising the steps of:

estimating a sampling clock offset amount and a common phase noise;

determining a sampling timing of the OFDM signal according to the estimated sampling offset amount; and

compensating for a rotated phase of the OFDM subcarrier due to the sampling clock offset in receiving the OFDM signal.